REMARKS

Claims 22, 23, 32 and 33 have been rejected under 35 U.S.C. § 103 as being allegedly unpatentable over International Published Patent Application No. WO 01/25141 to Sederquist (hereinafter "Sederquist) in view of U.S. Published Patent Application No. 2001/0045061 to Edlund et al. (hereinafter "Edlund"). Claims 24-29 and 34-40 have been rejected under 35 U.S.C. § 103 as being allegedly unpatentable over the combination Sederquist and Edlund in view of U.S. Published Patent Application No. 2003/0021743 to Wikstrom et al. (hereinafter "Wikstrom"). Claims 30 and 41 have been rejected under 35 U.S.C. § 103 as being allegedly unpatentable over the combination Sederquist and Edlund in view of U.S. Published Patent Application 2002/0117303 to Vinegar et al. (hereinafter "Vinegar"). Claims 31 and 42 have been rejected under 35 U.S.C. § 103 as being allegedly unpatentable over the combination Sederquist and Edlund in view of U.S. Patent 4,158,680 to McGann (hereinafter "McGann). Applicant respectfully traverses these rejections.

To establish a prima facie case of obviousness, three basic criteria must be met. First there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q. 2d 1438 (Fed. Cir. 1991); MPEP 2143. Here, the Examiner has failed to establish a prima facie case of obviousness because the combination of Sederquist and Edlund

independently or in combination with either Wikstrom, Vinegar or McGann does not teach or suggest all the claim limitations of claims 22-42.

Applicant respectfully submits neither Sederquist, Edlund, Wikstrom, Vinegar nor McGann is even remotely concerned with a method and system for producing hydrogen from a hydrocarbon with high energy efficiency while releasing very low or zero levels of carbon dioxide and pollutants using autothermal vapor reforming process at high pressure. The present invention contradicts the current teaching of the art of performing autothermal vapor reforming process at low pressure. It is well established that the Examiner cannot use hindsight gleaned from the present invention to modify or reconstruct the prior art reference to render claims unpatentable.

Sederquist relates to an autothermal reformer which uses an oxidant stream and a vapor stream to oxidize hydrocarbons in low pressure, which teaches away from the present invention. Applicant kindly directs the Examiner's attention to paragraphs [0019]-[0023] of the present application, which describes the autothermal vapor reforming process which is performed at low pressure. As admitted by the Examiner, Sederquist fails to teach or suggest operating the autothermal reformer in high pressures to intensify the heat exchanges, as required in independent claims 22 and 32.

To cure this fatal deficiency, the Examiner turns to Edlund. However, Edlund relates to a fuel processor which merely describes that "Steam reformers typically operate at temperatures in the range of 200° C. and 700° C., and at pressures in the range of 50 psi and 1000 psi." (Edlund at ¶ [0034]). As described in paragraphs [0014]-[0016] of the present application, vapor/steam reforming process is vastly different from the autothermal vapor reforming process of the present invention. In a vapor/steam reforming process, only vapor stream is used to oxidize the hydrocarbons and this reaction is highly endothermic (see [0016] of the present application), thereby performing

the steam/vapor reforming process at higher temperature and higher pressure conditions than the autothermal vapor reforming process. One of ordinary skill in the art would not combine the autothermal vapor reforming process which uses both oxidant and vapor streams to oxidize hydrocarbons with the steam/vapor reforming process which uses only vapor stream to oxidize hydrocarbons as suggested by the Examiner. In fact, these two different process cannot be readily combined as apparently suggested by the Examiner. Applicant respectfully requests that the Examiner cite a reference which suggests that vapor/steam reforming process can be combined with the autothermal vapor reforming process.

The prior must to be judged based on a full and fair consideration of what that art teaches, not by using applicant's invention as a blueprint for gathering various bits and modifying the pieces in an attempt to reconstruct applicant's invention. The Examiner cannot simply change the principle of the operation of the reference or render the reference inoperable for its intended purpose to render the claims unpatentable. Accordingly, it is submitted that the Examiner has succumbed to the lure of prohibited hindsight reconstruction.

Applicant respectfully submits that only the present invention teaches and suggests performing the autothermal vapor reforming process at high pressure to intensify the heat exchanges, as required in the pending claims of the present application. In fact, performing autothermal vapor reforming process at high pressure is contrary to the current art which use low pressures in autothermal vapor reforming process (*see* ¶¶ [0022]-[0023] of the present application.

"To imbue one of ordinary skill in the art with knowledge of the present invention, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim of the insidious effect of hindsight syndrome, wherein that which only the

inventor taught is used against the teacher." W.L. Gore & Assoc. v. Garlock, Inc., 721 F.2d 1540, 1553 (Fed. Cir. 1983). In the present case, none of the references teach or suggest performing the autothermal vapor reforming process at high pressure to intensify the heat exchanges, as required in claims 22-42.

Therefore, the Examiner has failed to establish a *prima facie* case of obviousness because the combination of Sederquist and Edlund does not teach or suggest all of the claim limitations of the pending claims, namely performing the autothermal vapor reforming process at high pressure to intensify the heat exchanges. The Examiner has impermissibly reconstructed Sederquist and Edlund to render the claims unpatentable using hindsight gleaned from the present invention. Further, there can be no reasonable expectation of success in combining the low pressure autothermal vapor reforming process of Sederquist with steam/vapor reforming process of Edlund because they describe vastly different reforming process.

Additionally, as admitted by the Examiner, the combination of Sederquist and Edlund does not teach or suggest the condensation of carbon dioxide into liquid form. To cure this deficiency, the Examiner turns to Wikstrom. However, Wikstrom does not cure the aforenoted deficiency of Sederquist and Edlund. None of the cited references teach or suggest performing the autothermal vapor reforming process at high pressure to intensify the heat exchanges, as required in claims 22-42.

Further, as admitted by the Examiner, the combination of Sederquist and Edlund does not teach or suggest the sue of electrolysis to produce pure oxygen. To cure this deficiency, the Examiner turns to Vinegar. However, Vinegar does not cure the aforenoted deficiency of Sederquist and Edlund. None of the cited references teach or suggest performing the autothermal vapor reforming process at high pressure to intensify the heat exchanges, as required in claims 22-42.

Furthermore, as admitted by the Examiner, the combination of Sederquist and Edlund does not teach or suggest a nitrogen production method that generates nearly pure oxygen. To cure this deficiency, the Examiner turns to McGann. However, McGann does not cure the aforenoted deficiency of Sederquist and Edlund. None of the cited references teach or suggest performing the autothermal vapor reforming process at high pressure to intensify the heat exchanges, as required in claims 22-42

Moreover, the claimed invention defined by the pending claims eliminates the shortcomings and disadvantages encountered with the prior art. Specifically, the claimed invention performs the autothermal vapor reforming process at high pressure to intensify the heat exchanges. None of the cited references are directed to the problem solved by the present invention. It is undeniable that neither Sederquist, Edlund, Wikstrom, Vinegar nor McGann is even remotely concerned with the problem of performing the autothermal vapor reforming process at high pressure to intensify the heat exchanges, as required in claims 22-42. The mere fact that the prior art can be modified does not make the modification obvious. Here, as noted herein, the Examiner's secondary reference (Edlund) relates to a totally different reforming process which only utilizes a vapor stream to oxidize hydrocarbons, and cannot be combined with Sederquist which relates to a low pressure autothermal vapor reforming process.

Absent evidence that the specific problem of performing the autothermal vapor reforming process at high pressure to intensify the heat exchanges was even recognized by the prior art, there can be no finding that the invention as a whole would have been obvious. In fact, the present invention is contrary to the current art which teaches performing autothermal vapor reforming process at low pressure. As stated by the PTO Board of Appeals in Ex parte Breidt and Lefevre, 161 U.S.P.Q. 767, 768 (1968), "an inventive contribution can reside as well in the recognition of a problem as in a solution". It further appears that the conclusion reached by the Board of Appeals in Ex parte Minks,

169 U.S.P.Q. 120 (1969), is here in point. There, the Board concluded that "[a]ppellant having discovered the source of the problem and solved the same ... he is ... entitled to patent protection". Id. at 121.

Since applicant has recognized a problem not addressed by the cited prior art and solved that problem in a manner not suggested by either Sederquist, Edlund, Wikstrom, Vinegar or McGann, the basis for patentability of the claims is established. See In re Wright, 6 U.S.P.Q. 2d, 1959, 1961-1962 (Fed. Cir. 1988). There, the CAFC relied upon previous decisions requiring a consideration of the problem facing the inventor in reversing the Examiner's rejection. "The problem solved by the invention is always relevant". Id. at 1962. See also, In re Rinehart, 189 U.S.P.Q. 143, 149 (C.C.P.A. 1967), which stated that the particular problem facing the inventor must be considered in determining obviousness.

In view of the foregoing, it is respectfully submitted that one of ordinary skill in the art, after reading and understanding Sederquist, would not even turn to Edlund – and if she did, she would not understand how or why Sederquist's autothermal vapor reforming process performed at low pressure should be combined with Edlund's steam/vapor reforming process.

Therefore, the Examiner has again failed to establish a *prima facie* case of obviousness because there is no reasonable expectation of success in combining Sederquist with Edlund. Accordingly, Applicant respectfully requests these rejections be withdrawn.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 50-0624, under Order No. NY-GRYN 220-US (10503998) from which the undersigned is authorized to draw.

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Respectfully submitted,

By 

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